Income Risk and Car Replacement

Søren Leth-Petersen
Economic Policy Research Unit, University of Copenhagen

Introduction and objective

Governments across the OECD area are implementing measures to stimulate consumption in order to counter the adverse effects of the economic crisis. Stimulus policies are (by construction) implemented when economic activity is slowing down. Recessions are for individual persons generally associated with increased uncertainty about future incomes, and this is likely to have dampening effect on spending, particularly spending on durables among which cars is the most prominent. The objective of this project is to answer the following question:

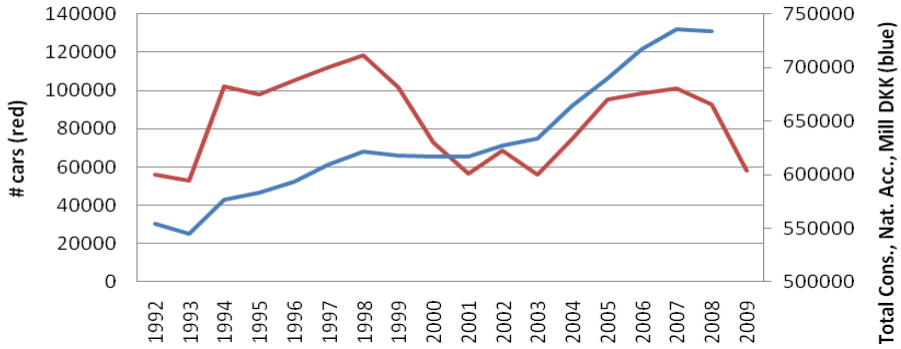
How does income uncertainty influence car purchases?

To answer the research question we develop a structural stochastic life cycle model of car purchasing and saving behaviour and estimate its parameters on Danish register data with longitudinal information about car purchases, incomes and holdings of financial asset for the period 1992-2008. This approach will deliver the structural parameters of the consumers' problem making it possible to assess the importance of uncertainty (and changes thereof) of future income for the car purchase decision.

Policy relevance

This study should be of primary interest to (Danish) policy makers wishing to use fiscal stimuli in order to recover aggregate economic activity. Figure 1 illustrates the development in the registration of new cars in Denmark in the period 1992-2009 together with the development in total household sector consumption from the National Accounts. The graph shows dramatic variations in the registration of new cars compared to total spending by households. It is exactly these variations we aim at explaining, and this project will investigate how uncertainty and changes in uncertainty affect durable expenditure. This will improve the understanding of the role of fiscal policy in stabilizing the economy.

Figure 1: Car Registrations and Total Private Consumption



This study

We propose to build an equilibrium stochastic finite horizon life cycle model where agents maximize expected present discounted utility of nondurable consumption and the use of car services which we assume is proportional to the stock of cars. Agents are assumed to be risk averse. In each period the household makes decisions about nondurable consumption, and about replacing the existing car. Decisions are made subject to an intertemporal budget constraint specifying the resources (including labour income) available to household at each point in time over their finite life time.

The car is distinguished from nondurable goods (such as food) by the fact that it can provide a stream of consumption flows over several periods. Transactions costs are associated with trading because of asymmetric information about the quality of the car. This is the well-known "lemons" problem, Akerlof (1970). In this model asymmetric information about the quality of the car leads to different buying and selling prices of cars[1].

Income is uncertain, and the income process will be assumed to have a permanent and a transitory component, as in Blundell, Pistaferri and Preston (2008), Meghir and Pistaferri (2004) and Ejarque and Leth-Petersen (2009). This allows for separating the responses to income shocks of different degrees of persistence. This is an important distinction because different types of shocks may have different effects on spending behaviour.

The dynamic and stochastic nature of the model is essential for understanding how agents anticipate future events and incorporate them in their current decisions. The partial irreversibility of the car purchase decision (because of the lemons problem) will imply that consumers will hesitate before locking assets into a car purchase, lest they find themselves in future difficulties. The model pins down how households anticipate the nature of income shocks in the future, such as the possibility of unemployment events and link this to the timing of the car replacement decision. For example, a risk averse household learning that future income has become more uncertain will postpone the replacement of the car until (some of) the uncertainty is resolved.

The parameters of the model will be estimated, using the method of simulated moments, Chernozhukov and Hong (2003), on the Danish research data base covering 100% of the Danish population and including information about demographic indicators, and about income and holdings of liquid assets (cash in banks, bonds and stocks), and debt for the period 1992-2008. These data will be merged with data from the central register for motor vehicles containing information about all cars registered in Denmark in the period 1992-2008 together with information about the car brand, the model, and vintage. In the combined data set it is possible to follow income and car ownership histories at the household level. This feature outstanding compared to any other known data set and is crucial for the purposes of this project. For being able to estimate the model it is also crucial to have information about the average brand-model-vintage specific sales prices of both new and 2nd cars. These prices are collected for 1995-2009 by the association of car dealers (DAF) and will be bought for this project.

The research group, expected output and publication potential

The participants in the project are Søren Leth-Petersen, Richard Blundell, Costas Meghir and Hamish Low. Søren Leth-Petersen is a specialist in applied microeconometric analysis of consumption and savings behaviour based on administrative register data. Richard Blundell and Costas Meghir, both at University College of London and IFS, are among the most influential contributors to the literature on consumption/savings in the past 20 years. Hamish Low, Cambridge University and IFS, is a specialist in solving dynamic programming models of consumption and savings behaviour.

The plan is to prepare one academic paper. This is the first study ever to model the importance of income uncertainty for the car replacement decision. Because of the outstanding features of the Danish data, the application of update estimation techniques and the theoretical innovations we expect to be able to make contributions at a high level. We plan to start the project in 2010 and to have at least one paper ready for conference and subsequent journal submission during 2013.

[1] The buying and selling prices differ because the buyer does not know the true quality of the car. Good and bad cars must sell for the same price, because buyers do not know the true value of the car. The buyers are therefore willing to pay what they expect to be the average value among cars in the market. Sellers, on the other hand, know the true value of their cars. Hence the asymmetry between selling and buying prices.

Budget

This application concerns money for purchasing data, funds for hiring a research assistant and funds for the financing of travel expenditures. The analysis is to be based on a 100% sample from the Danish research data base that we already have access to. Two key components for the proposed project are car prices and car holdings. These data are not included in the 100% sample and should be bought. The costs of purchasing these data are 113,935 DKK. Quotes from DAF and Statistics Denmark are enclosed. The car price data and the car ownership data need to be merged at the level of the car type. This requires a common format describing the car model in both the car price data set and the car ownership dataset. Unfortunately the two data sets do not share the same format. We therefore apply for funding for a research assistant that will harmonize the car model variable across the two data sets. This is an extremely tedious and time consuming task. The application also concerns funding for covering travel expenditures for Søren Leth-Petersen. This includes travelling to London to meet with the other participants in the projects and for participation in conferences where the paper will be presented.

References

Akerlof, G. A. (1970); The Market for "Lemons": Quality Uncertainty and the Market Mechanism; *The Quarterly Journal of Economics*, 84(3), pp. 488-500

Blundell, R., L. Pistaferri, and I. Preston (2008); Consumption Inequality and Partial Insurance; *American Economic Review*, 98(5), pp. 1887-1921.

Chernozhukov, V. and Hong, H. (2003); An MCMC Approach to Classical Estimation; *Journal of Econometrics*, 115, pp. 293-346.

Ejarque, J. and Leth-Petersen, S. (2009); Consumption and Savings of First Time House Owners; Manuscript, University of Copenhagen

Meghir, C. and Pistaferri, L. (2004); Income Variance Dynamics and Heterogeneity; *Econometrica*, 72(1), pp. 1-32.

Total Budget: Income Risk and Car Replacement

	2010				2011				2012				Total			
	The Council		Co-financing		The Council		Co-financing		The Council		Co-financing		The Council		Co-financing	
	Months	DKK	Months	DKK	Months	DKK	Months	DKK	Months	DKK	Months	DKK	Months	DKK	Months	DKK
Total technical administrative salaries	**1**	**25.506**			**2**	**52.134**							**3**	**77.640**		
Research assistant (student)	1	25.506			2	52.134							3	77.640		
Total operating expenses		**113.935**				**20.000**				**20.000**				**153.935**		
Data, AutoIT		50.000												50.000		
Data, Statistics Denmark		63.935												63.935		
Travel		0				20.000				20.000				40.000		
Overhead 20%		**27.888**				**14.427**				**4.000**				**46.315**		
Total		**167.329**				**86.561**				**24.000**				**277.890**		

Søren Leth-Petersen

Fra: Susanne Bang Vind [SBV@dst.dk]
Sendt: 12. februar 2010 16:45
Til: Søren Leth-Petersen
Emne: Pristilbud for projekt vedr. bildata

Kære Søren,

Vedr. pristilbud for projekt vedr. bildata.
Hvis projektet skal samkøres med CAM's projekt 702487 og det inkluderer nye registre er det dog en forudsætning at der indsendes ny projektindstilling, som godkendes herfra.
Pristilbudet som er med de pt. gældende priser dækker :

- registerudtræk fra COR-oplysningssedler
- registerudtræk fra Bildata (36.897 kr. ex.moms)
- anonymisering af bildata
- rådgivning efter fastpris

Et samlet pris dækkende perioden 1992-2009 bliver 54.103 kr. ex. moms.

Tilbuddet er gældende indtil 01.07.2010.

Med venlig hilsen

Susanne Vind

Danmarks Statistik
Forskningsservice
Tlf. 39 17 32 36
Mail: sbv@dst.dk

Søren Leth-Petersen

Fra: Anders Dencker [ad@autoit.dk]
Sendt: 22. december 2009 13:37
Til: Søren Leth-Petersen
Emne: SV: Proser på brugte biler

Hej Søren
Jeg har nu undersøgt mulighederne for at kunne opfylde dine ønsker. Vi kan gå 15 år tilbage, det vil sige, at du vil få 15 tabeller/udtræk, indeholdende årgangene, som du beskriver nedenfor. Jeg skal gøre opmærksom på, at vi taler en teoretisk beregnet brugtvognspris, baseret på vores erfaring – altså vil der ikke være taget hensyn til bilernes faktiske stand og andre usikkerhedsmomenter – det vil være en gennemsnitsbetragtning. Det som vi kan levere, kan du ikke få bedre andre steder, så det er overvejelsen værd.

For at kunne vurdere omfanget af data, ville det være prisværdigt – såfremt du kunne oplyst hvilke data – udover priser, årgang, mærke, model, variant – udtrækket skal indeholde?

Er det kun dette ene udtræk, samt oprindelig nyvognspris – vil det være muligt at gøre for en pris på 50.000 kr. – samlet

Lad mig høre fra dig.

Hvis vi ikke skrives ved inden – så Rigtig Glædelig Jul

Med venlig hilsen
Auto·IT A/S
Anders Dencker
Markedschef

Tlf: +45 88 82 62 60/26 77 92 40
Mail: ad@autoit.dk
www.autoit.dk | www.biltorvet.dk

Microsoft CERTIFIED Partner | ISV/Software Solutions

Fra: Søren Leth-Petersen [mailto:Soren.Leth-Petersen@econ.ku.dk]
Sendt: 21. december 2009 09:24
Til: Anders Dencker
Emne: Proser på brugte biler

Hej Anders

Jeg ringede til dig for at høre, om I har mulighed for at skaffe priser på brugte biler tilbage i tid. Det vil sige for eksempel prisen på en Mazda 626, 2.0 …. årgang 1996 i 1997, 1998, 1999, …..

Jeg skal arbejde med bilregistret fra Danmarks Statistik, som indeholder information om enkeltpersoners bil-ejerskab, tilbage til 1991. Det er derfor værdifuldt for mig at komme så lang tilbage i tid som muligt.

Jeg ser frem til at høre fra dig

Mvh
Søren

DEPARTMENT OF ECONOMICS
UNIVERSITY OF COPENHAGEN

Søren Leth-Petersen

Øster Farimagsgade 5, building 26
DK-1353 Copenhagen
Email: soren.leth-petersen@econ.ku.dk
phone: +45 35323084

April 2010

Curriculum Vitæ

Søren Leth-Petersen

Office:
Department of Economics
University of Copenhagen,
Øster Farimagsgade 5, Building 26
DK-1353 Copenhagen K

Telephone: 35323084
Email: Soren.Leth-Petersen@econ.ku.dk
Homepage: www.econ.ku.dk/leth

Private:
K. A. Hasselbalchs Vej 48
3070 Snekkersten
Telephone: 61264954

Personal Details

Born 15 September 1970

Current position

Associate Professor

Professional Affiliations

CAM, Centre of Applied Microeconometrics

EPRU, Economic Policy Research Unit

Previous Employment

1998-2007, AKF, Danish Institute for Governmental Research (research assistant, Ph.D., research economist, senior research economist).

1997-1998, Statistics Denmark, Head of Section.

Education

Ph.d., Economics, University of Copenhagen, 2003
Cand.polit., University of Copenhagen, 1997
M.Sc. in Economics, University of Southampton, 1996

Research Interests

All my past an ongoing research is within applied microeconometrics and is focussed on the estimation of household behaviour on micro data within a range of topics, most notably intertemporal consumption allocation and savings, household finance, and demand behaviour. However, I also do work related to health and labour market issues and on the development of methods for analyzing micro data. Almost all my work is based on Danish administrative register data and exploit the unique features of these data. A central theme in my research is evaluation of public policies, and the use public policy schemes to test theories of economic behaviour. My research includes work based on what is sometimes labelled the reduced form approach but also includes work that relying very strongly on theoretical structures.

Teaching, Supervision, and Teaching Training

Teaching

2007-9: Lecturing and examining Quantitative Methods 2: fall 2007, fall 2008, fall 2009.

2007: Lecturing and examining: Advanced Microeconometrics: fall 2007.

2005: External Associate Professor, Lecturing Advanced Microeconometrics: fall 2005, Department of Economics, University of Copenhagen..

2004: Teaching assistant, class in Advanced Microeconometrics: fall 2004, Department of Economics, University of Copenhagen.

2003: Teaching assistant, class in Econometrics 1: spring and fall 2003. Department of Economics, University of Copenhagen.

Ph.D Supervision

- Michael Jørgensen, SFI
- Torben Heien Nielsen, SFI and Department of Economics
- Nina Blöndahl, Department of Economics (co-supervisor)
- Niels Skipper, Department of Economics, University of Aarhus (co-supervisor)
- Peer Skov, Department of Economics and the Rockwoll Foundation (registration in progress)

Supervision of Master Theses

Peter Kijne and Michael Hedrich (2007), Michael Drescher (2008), Jørgen Sloth Bjerre Hansen (2008), Jakob Jans Johansen (2008), Rasmus Landersø (in progress), Jakob Ladekjær (in progress)

Research activities

Refereeing

Economica, The Economic Journal, Empirical Economics, The Energy Journal, Energy Economics Nationaløkonomisk tidsskrift, Scandinavian Journal of Economics; The Austrian Science Fund, The Research Council of Norway, Social Sciences and Humanities Research Council of Canada.

Organization of Conferences:

- Organizer of the Microeconometric Network Meeting, 9-11 July 2009.
- CAM Research Workshop, 20 December 2007 and 16 December 2008 (with Bertel Schjerning).
- International conference “Household Choice of Consumption, Housing and Portfolios”, June 9-11 2005, Copenhagen (with Martin Browning)

Other Activities

- Coordinator of Microeconometric Network
- Member of PhD committees: (1) Martin Junge; (2) Bertel Schjerning; (3) Laura Mørch Andersen; (4) Torben Sørensen (University of Aarhus)

Publications

Scientific Journals:

(1) Leth-Petersen, Søren (2010); Intertemporal Consumption and Credit Constraints: Does Consumption Respond to An Exogenous Shock to Credit?; Accepted *American Economic Review*.

(2) Maria Gleerup, Anders Larsen, Søren Leth-Petersen, Mikael Togeby (2010); The Effect of Feedback by SMS-text messages and email on Household Electricity Consumption: Experimental Evidence; *The Energy Journal*, vol. 31, no. 3.

(3) Leth-Petersen, Søren & Rotger, Gabriel Pons (2009); Long-term Labour Market Performance of Whiplash Claimants; *Journal of Health Economics*, 28(5), pp. 996-1011.

(4) Bjørner, Thomas Bue & Leth-Petersen, Søren (2007); A Dynamic Random Effects Multinomial Logit Model of Household Car Ownership; *The Journal of the Danish Economic Society (Nationaløkonomisk Tidsskrift), 145, pp. 83-100.*

(5) Leth-Petersen, Søren (2007); Habit formation and Consumption of Energy for Heating: Evidence from a Panel of Danish Households. *The Energy Journal*. 28(2).

(6) Larsen, Anders & Leth-Petersen, Søren & Hansen Kjærbye, Vibeke & Olaf Rieper & Schiöpffe, Marianne (2006) The Effect of Energy Audits in Danish Industry – Evaluation of a DSM Programme; *The Energy Studies Review*, vol. 14, no. 2, pp. 30-41.

(7) Bjørner, Thomas Bue. & Leth-Petersen, Søren (2005*); Dynamic Models of Car Ownership at the Household Level*; *International Journal of Transport Economics*, vol. XXXII, no. 1, February 2005

(8) Leth-Petersen, Søren (2003); Forbrug af fjernvarme og elektricitet I husholdninger; *The Journal of the Danish Economic Society (Nationaløkonomisk Tidsskrift)*, bd. 141, nr. 3, december 2003

(9) Browning, Martin og Søren Leth-Petersen (2003): Imputing Consumption from income and wealth information. *The Economic Journal*, Volume 113: Issue 488, F282-301, June 2003.

(10) Leth-Petersen, Søren (2002); Micro Econometric Modelling of Household Energy Use: Testing for Dependence between Demand for Electricity and Natural Gas; *The Energy Journal.* 2002; 23(4): 57-84

(11) Leth-Petersen, S. & Togeby, M. (2001); Demand for Space Heating in Apartment Blocks: Measuring Effects of Policy Measures Aiming at Reducing Energy Consumption; *Energy Economics* 23, pp. 387-403.

(12) Birkeland, Mikkel Egede og Søren Leth-Petersen (1999): Uddannelsesvalg og selvselektion for studenterårgangene 1978 til 1983. *The Journal of the Danish Economic Society (Nationaløkonomisk tidsskrift)*. Bd. 137 Nr. 3, pp. 342-359. December 1999

Papers submitted to Scientific Journals

(13) Ejarque, Joao & Leth-Petersen, Søren; Consumption and Savings of First Time House Owners; Revise and resubmit *Review of Economic Studies*.

(14) Browning, Martin & Gørtz, Mette & Leth-Petersen, Søren; Housing Wealth and Consumption: a Micro Panel Study. Submitted to *Economic Journal*.

Other Publications

(15) Kolodziejczyk, Christophe & Leth-Petersen, Søren; Motives for Transfers from Parents to Children: Tests with First-Time House Owners' Data, CAM WP 2010-1, Department of Economics, University of Copenhagen.

(16) Alan, Sule & Honoré, B. & Leth-Petersen, S. (2008); Estimation of Panel Data Models with Two-sided Censoring; Department of Economics, University of Copenhagen,

(17) Alan, Sule & Leth-Petersen, S. (2006); Tax Incentives and Household Portfolios: A Panel Data Analysis.CAM WP 2006-13, Department of Economics, University of Copenhagen.

(18) Leth-Petersen, Søren (2003); *Empirical Studies of Micro Data on Residential Energy Demand*, Ph.d-afhandling, Rød Serie, nr. 89, 2003, Økonomisk Institut, Københavns Universitet

(19) Leth-Petersen, S. (2001); *Micro Evidence on Household Energy Consumption*; AKF memo, AKF, Copenhagen.

(20) Leth-Petersen, Søren; Elisabeth Kjellsson og Mikael Togeby (2000): *Demand for Space Heating in Apartment Blocks: Evidence from Denmark and Sweden.* AKF Forlaget

(21) Leth-Petersen, Søren (1999): *Olie- og gasressourcerne i nationalregnskabet og vurdering af bæredygtighed*. AKF memo.